

***Conservation Assessment
for
The Rock Pocketbook (*Arcidens confragosus*) Say, 1829***



USDA Forest Service, Eastern Region
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Kevin J. Roe
Department of Biological Sciences
Saint Louis University
St. Louis, MO 63103-2010



This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service – Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

The Rock Pocketbook, *Arcidens confragosus* (Say, 1829) is a large, inflated mussel that is found in medium sized rivers on a variety of substrates. *A. confragosus* can be distinguished from other mussels by its large but heavily sculptured thin shell, and the poorly developed lateral teeth. The historical range of *A. confragosus* includes the Mississippi River and its tributaries, as well as gulf coastal rivers from the Colorado River in Texas east to the Mobile River System in Alabama. *A. confragosus* is not listed by the U. S. Fish and Wildlife Service as threatened or endangered, however several states have listed this species.

Arcidens confragosus is bradyctictic (spawning occurs in the summer). Several fish hosts have been identified for this species. Factors considered detrimental to the persistence of this species are non-native freshwater bivalves, pollution, and habitat perturbation such as gravel mining. Additional information regarding life history and genetic variation in *A. confragosus* should be obtained prior to initiation of captive breeding and re-introduction or translocation projects.

SYNONYMY

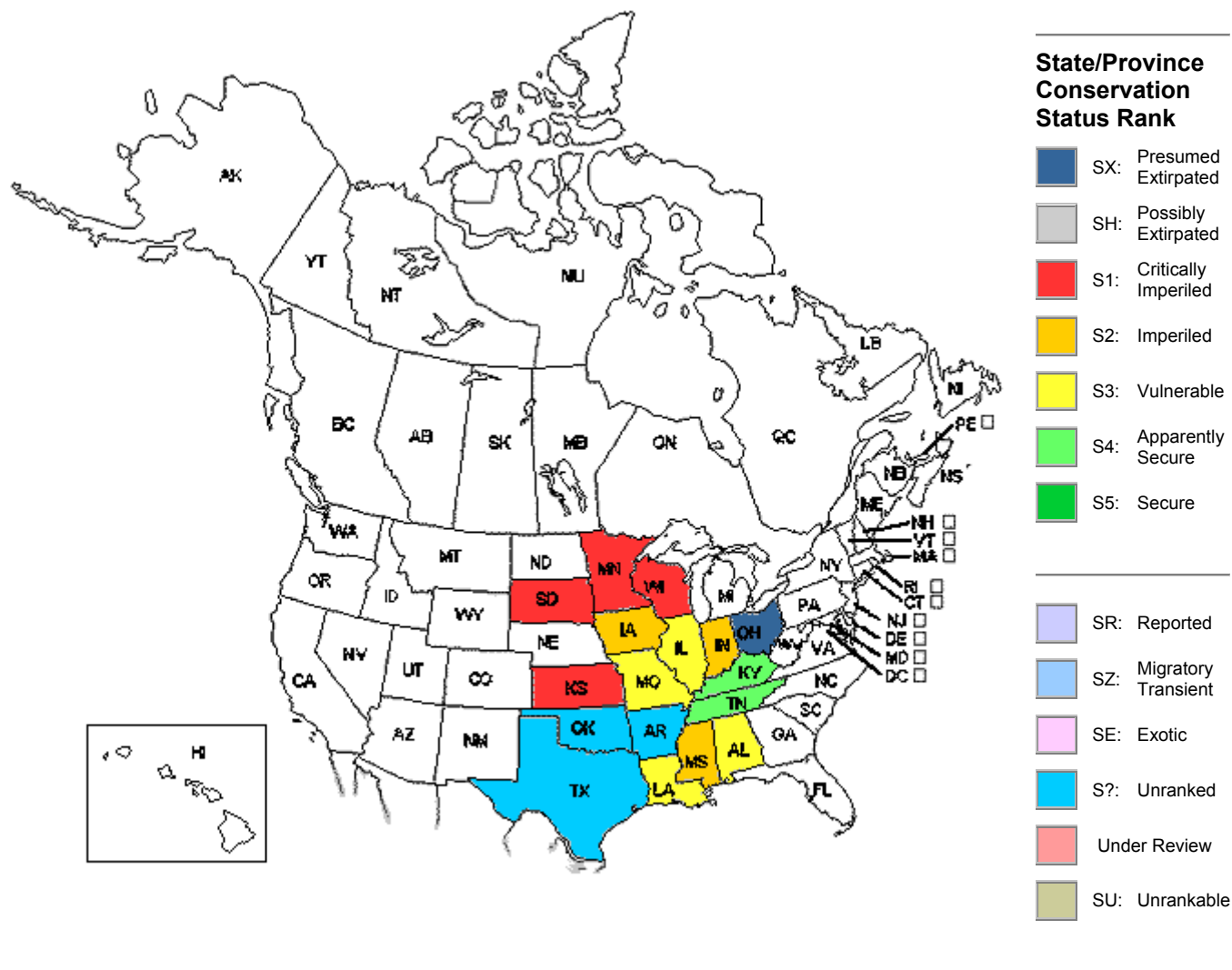
Arcidens confragosus Say, 1829; Say, 1829:339; Say, 1831: pl.21
Unio confragosus (Say, 1829); Deshayes, 1835: 552
Margarita (Margaritana) confragosa (Say, 1829); Lea, 1836:43
Unio confragosus (Say, 1829); Catlow and Reeve, 1845:57
Margaron (Margaritana) confragosa (Say, 1829); Lea, 1852c:42
Baphia confragosa (Say, 1829); H. and A. Adams, 1857: 500
Margaritana confragosa (Say, 1829); Calkins, 1874:46
Arcidens confragosa (Say, 1829); Simpson, 1900a:662
Arcidens (Arcidens) confragosus (Say, 1829); Clarke, 1981b:89
Arcidens confragosa jacintoensis Strecker, 1931; Strecker, 1931:13

Type Locality: Bayou Teche, St. Mary Parish, Louisiana.

DISTRIBUTION

Mississippi River Basin from Minnesota south to Louisiana and from southern Ohio west to eastern Kansas. In the south, from eastern Texas east to western Alabama along the Gulf of Mexico. Johnson, (1980) indicated that as this species was not reported to occur in the Tennessee River by Ortmann (1918, 1924) that it was likely introduced there post impoundment.

Alabama (S3), Arkansas (S?), Illinois (S3), Indiana (S2), Iowa (S2), Kansas (S1), Kentucky (S4S5), Louisiana (S3), Minnesota (S1), Mississippi (S2), Missouri (S3), Ohio (SX), Oklahoma (S?), South Dakota (S1), Tennessee (S4), Texas (S?), Wisconsin (S1S2).



DESCRIPTION

A relatively large and inflated mussel. The shells range from thin to fairly solid. The beaks are high above the hinge-line and the beak sculpture is distinctive, consisting of nodules that form two irregularly shaped loops. These continue as knobs onto the disk of the shell. In addition, some rough ridges are present on the posterior portion of the shell. The periostracum is dark-brown or black, and growth lines are fairly prominent. The nacre is white. The glochidia of *A. confragosus* is described by Hoggarth, (1999) as "pyriform" or pear-shaped. The average length and height are 359 and 354 μm respectively. A large "styliform" hook extends from the ventral surface of each valve. The valve edges near the base of the hooks are covered in micropoints that extend onto the hook and transition into larger "microstylets."

LIFE HISTORY AND ECOLOGY

Arcidens confragosus appears to prefer medium sized rivers (Murray and Leonard, 1962). Buchanan (1980) reported it in a range of substrate types, from silt to cobble and boulder, and in water from 4 inches to 3.5 feet. Murray and Leonard (1962) reported this species in substrates as varied as mud to sand and gravel and in slow to swift currents. Utterback (1915) described the reproductive habit of *A. confragosus* as bradytictic, and Baker (1928a) indicated that the breeding season ranged from September to June. Six species of fishes have been identified as suitable hosts for *A. confragosus*: *Ambloplites rupestris*, *Anguilla rostrata*, *Aplodinotus grunniens*, *Dorosoma cepedianum*, *Ictalurus punctatus*, *Pomoxis annularis* (Surber, 1913; Wilson, 1916; Howells, 1994).

STATUS

The status of *arcidens confragosus* was considered currently stable by Williams et al. (1993). Parmalee (1967) listed *a. Confragosus* as common in Illinois, whereas Murray and Leonard (1962), Goodrich and Van der Schalie (1944) and Dawley (1947) listed this species as uncommon in Missouri, Kansas, Indiana, and Minnesota respectively. More recently, Cummings and Mayer (1992) listed *a. Confragosus* as extirpated in Ohio, threatened in Wisconsin, rare in Missouri, and uncommon in the rest of the Midwest. *A. Confragosus* is considered threatened in Kansas. According to Howells et al. (1996) and Parmalee and Bogan (1998) *a. Confragosus* occurs in reservoirs in both Texas and Tennessee where it appears to be doing well. *Arcidens confragosus* is not a commercially valuable species and so has not suffered from over-harvesting. Detailed information on the current status of this species by state was difficult to acquire; however an examination of museum holdings indicates that *a. Confragosus* has been collected recently throughout much of its range. The low number of specimens in museum collections supports the idea advanced by Coker (1919) that this species may have historically been uncommon throughout its range. The host fishes for *a. Confragosus* are generally common species and it appears that this aspect of the rock pocketbook's natural history is intact.

LIMITING FACTORS

Although *A. confragosus* appears to be a historically uncommon species, there are several factors that have been implicated in the decline of other freshwater mussel species that may have a detrimental effect on *A. confragosus*. While this species appears to do well in impoundments, other factors such as pollution, gravel mining, channel modifications and the introduction of non-native species are likely to be detrimental to *A. confragosus*.

Zebra Mussels

The introduction and consequent spread of *Dreissena polymorpha* in the mid to late 1980's has severely impacted native mussel populations in the Lower Great Lakes region (Schlosser et al. 1996). Adverse effects on unionid mussels stem primarily from the attachment of *D. polymorpha* to the valves of native mussels. In sufficient numbers, *D.*

polymorpha can interfere with feeding, respiration, excretion, and locomotion (Haag et al. 1993, Baker and Hornbach 1997). It has been estimated that the introduction of *D. polymorpha* into the Mississippi River basin has increased the extinction rates of native freshwater mussels from 1.2% of species per decade to 12% per decade. A study by Martel et al. (2001) found that *D. polymorpha* was responsible for the local extirpation of unionids from the Rideau River in eastern Ontario.

Native mussels have shown differential sensitivity to *D. polymorpha* infestations. Mackie et al. (2000) stated that smaller species with specific substrate requirements and few hosts and were long-term brooders were more susceptible than larger species with many hosts, that were short-term brooders. *Arcidens confragosus* is a long-term brooder but is a medium to large sized mussel, also it seems to do well in silty substrates which may allow it to clean off any accumulated *D. polymorpha* by digging deeper into the sediment and smothering them.

Siltation

Accumulation of sediments has long been implicated in the decline of native mussels. Fine sediments can adversely affect mussels in several ways they can interfere with respiration, feeding efficiency by clogging gills and overloading cilia that sort food. It can reduce the supply of food by interfering with photosynthesis. Heavy sediment loads can also smother juvenile mussels. In addition, sedimentation can indirectly affect mussels by affecting their host fishes (Brim-Box and Mossa, 1999). Strayer and Fetterman (1999) have suggested that fine sediments may be more harmful to mussels in lower gradient streams where sediments can accumulate. *Arcidens confragosus* appears to do well in substrates of mud and fine sand although the presence of large amounts of suspended fine sediments may have the same adverse effects seen on feeding and respiration in other mussels.

Pollution

Chemical pollution from domestic, agricultural, and domestic sources were responsible for the localized extinctions of native mussels in North America throughout the 20th century (Baker, 1928, Bogan, 1993). According to Neves et al. (1997) the eutrophication of rivers was a major source of unionid decline in the 1980's, while Havlik and Marking (1987) showed that many types of industrial and domestic substances: heavy metals, pesticides, ammonia, and crude oil were toxic to mussels.

Dams/Impoundments

Impoundments whether for navigational purposes or for the generation of power can dramatically affect the habitat of freshwater mussels. Impoundments alter flow, temperature, dissolved oxygen, substrate composition (Bogan, 1993). In addition, they can isolate freshwater mussels from their host fishes thereby disrupting the reproductive cycle. Changes in water temperature can suppress or alter the reproductive cycle and delay maturation of glochidia and juvenile mussels (Fuller, 1974, Layzer et al. 1993). As

stated previously the presence of impoundments does not appear to adversely affect *A. confragosus* upstream of the impoundment.

POPULATION BIOLOGY AND VIABILITY

Based on currently available information *A. confragosus* appears to be maintaining stable, albeit low numbers of individuals throughout its range. As with many species of freshwater mussel, no genetic surveys have been conducted on this species and little is known about its life history relative to other mussel species. Museum records indicate that specimens of *A. confragosus* have been collected in each of the following states in the last 10 years: Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, and Wisconsin. Howells et al. (1996) indicate that *A. confragosus* has been collected in Texas during the 1990's as well.

SPECIAL SIGNIFICANCE OF THE SPECIES

Arcidens confragosus is the only member of the genus *Arcidens*, and as such should perhaps be given special consideration for protection. No objective phylogenetic analyses have included *A. confragosus* and so its true affinities remain unclear. Several authors have indicated that this species is most closely related to the Ouachita Rock Pocketbook, *Arkansia wheeleri* and members of the genus *Lasmigona* (Johnson, 1980). Similarities in shell sculpture and lateral teeth shape point to some affinity with *Arkansia* and *Lasmigona*, these hypotheses should be investigated further.

MANAGEMENT RECOMMENDATIONS

Because of the lack of information on the natural history of *A. confragosus* it is difficult to make detailed recommendations for the management of this species. However, the observations that this species thrives in impoundments and utilizes several common species as hosts bode well for the long-term survival of this species. Like many unionid mussels *A. confragosus* appears to be adversely affected by zebra mussels. Populations of *A. confragosus* in impoundments may be particularly susceptible to *D. polymorpha*, since the impounded areas are more similar to the large stable habitats of its native range (i.e. Caspian Sea and Ural River) (McMahon and Bogan, 2001), and may allow zebra mussels to achieve greater densities than in more lotic environments.

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